China's Revolution in Military Affairs (RMA): Rattling Mao's Army

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China's Perception of Revolution in Military Affairs

Translated literally into Chinese, revolution in military affairs (RMA) becomes military revolution (*jun shi ge ming*), and for the Chinese these two terms have qualitatively different meanings. Chinese perceptions of RMA include the following:

-- Rapid technological innovation and its impact on armament industries; the adoption and integration of micro electronic technologies into ordnances and weapon platforms which fundamentally change the conduct of war operations. These include the use of precision guidance weapon systems, information technology-based C^4ISR, and revolutionary changes in strategies, operations, and tactics.[1]

-- A collection of systems that use information technology to process intelligence to give C^4ISR real time capabilities, along with advances in doctrine and tactics to use these new capabilities in war[2].

-- A new military revolution *(xin jun shi ge ming)*, which is entirely different from conventional technology-based military revolution. It implies a qualitative change in weapon systems and equipment design which is characterized by information based precision guidance weapon systems, operational platforms, digitalized armed forces, and C^4ISR etc. It also comprises revolutionary approaches in military thinking and theories; and it has impacted the very structure of military organizations.

The People's Liberation Army (PLA) has been attracted to the concepts and debates surrounding RMA, but is currently neither embracing nor implementing it. Obstacles preventing the PLA from pursuing RMA are threefold. First, China's overall military strategy is still dominated by homeland defense, with sovereignty and territorial integrity as the two primary national defense concerns. Decision-making is largely dominated by the ground force commanders, leaving the air force and the navy as adjunct services merely assisting ground operations. This may be an intrinsic characteristic of the PLA's tradition, yet it has posed challenges in achieving "jointness" in operations, a key node in RMA operational concept. Secondly, technological and industrial backwardness has prevented the PLA from leap-frogging its technological levels and producing state of the art weapon systems and platforms, which is necessary to realize RMA. Thirdly, the poor education and training systems and facilities have slowed the process of transforming a conventional army into a technologically adept military organization.

The constraints, however, have not prevented the PLA from pursuing some aspects of RMA which are in line with "limited targets, setting up priorities" defense construction policies. These are designed to improve its operational capabilities in fighting and winning a "local war under high-tech conditions". Under such a conception of modern war the implementation of Chinese RMA gives priority to:

--Pursuing research and development of key node technologies such as advanced laser/particle beam technologies and precision terminal guidance technologies. These technologies may enable China to produce laser weapon systems which enhance

anti-aerial weapon capabilities and precision terminal guidance technology which are designed to enhance China's strategic weapons kill rate and survivability.

--Selecting development of electronic information technology and integrating it with precision guidance weapon systems. Information and precision guidance technologies are considered "force multipliers", an indispensable element in conducting modern warfare under high-tech conditions. Information technology and artificial intelligence are not only shaping new tactical/operational concepts but also allowing China to leapfrog in advanced technologies and close the technological gap between China and advanced western countries[4].

The impact of RMA on China's defense thinking in the last decade can be summarized as follows:

--Technology and weapon systems revolution have been key in elevating the PLA from a backward "people's war army" to a modern military force.

--Technology and weapon systems modernization should be selective and should give priority to technology which can produce "pockets of excellence". These include electronic and information warfare, precision guidance munitions, and laser weapon systems.

--There remains a need to restructure the armed forces, and to develop new tactics and doctrines to improve operations under high-tech conditions

Motivation in Pursuing RMA

As China articulates policy and strategy objectives couched in strongly nationalistic language, observers fear its rise as a belligerent regional power. These objectives include:

a. A continual emphasis on the primary interests of national unity, territorial integrity, and socialism. In addition the regime is concerned with developing the economy, with the goal of maintaining high and stable economic growth to the level of a "middle power". Such a development program requires not only the exploitation of resources in its land mass, but also redirects policy makers to focus on maritime strategies to explore and excavate natural resources in peripheral sea territories such as the South China Sea, the East Sea, and the Yellow Seato protect its Exclusive Economic Zones (EEZs) and Sea Lanes of Communication (SLOC). This national economic development strategy requires the PLA to develop and implement an off shore defense strategy.

b. With domestic agitation to unify Taiwan sometime in this century, leadership in Beijing has tasked the PLA to develop operational doctrines for military operations against Taiwan if necessary. To do so it must develop limited state of the art advanced weapon systems to deny U.S. military intervention.

c. In response to advancements in the technology of information systems, conventional war fighting is being shaped by the concepts and doctrines of RMA. The PLA is engaged in the process of adjusting its defense strategy and operational doctrine from that of a "People's War Under Modern Conditions" to that of a "Local War under Hi-tech Conditions"[6].

Following these specific interests, China's defense policy in recent years has focused on following main aspects:

a. Implementing an active defense strategy under hi-tech conditions, with an emphasis on building a lean armed force characterized by quality and professionalism.

b. Strengthening the armed forces by relying on science and technology. This involves transforming the armed forces from a man-power-intensive to a technology-intensive organization, as well as improving the technological level of weaponry.

c. Developing offensive operational capability with an emphasis on select PLA units-primarily the first or *"quantau"* units-and other Rapid Reaction Forces (RRFs). This involves practicing rapid reaction combined exercises under modern hi-tech conditions to win hi-tech local wars along China's periphery.

Since the early 1990s, Chinese policy and defense planners have conducted a series of measures to cope with this new defense policy. China has downsized its armed forces, and this manpower reduction has contributed to a restructuring of the PLA into a military force consisting of three components: a small number of flexible high-technology forces for use in regional contingencies; a larger number of standing and reserve forces equipped with low-to-medium technology weapons for internal security; and a modest nuclear force to maintain as a viable deterrent against other nuclear powers.

China's military leaders already have begun to develop the tactics these forces will employ. The core institutions to assist military leadership in developing new campaign and battlefield doctrines and tactics under hi-tech conditions are the Academy of Military Science (AMS) and National Defense University (NDU) in Beijing[7]. AMS and NDU are not only the primary source for new tactics and doctrines based on RMA concepts, but they also assist the military leadership in assessing their implementation. Concurrently, military schools and academies have undergone much reform and restructuring in recent years. They have assumed a more important role in professional development, with the aim of creating a better-educated and technologically skilled force, both in the officer corps and the enlisted ranks. Currently, all officers above the regimental level must pass the curriculum requirement at the National Defense University.

Force reduction and technology-based education are necessary steps to meet requirements of the PLA's three principles of modern military construction. These are the establishment of a compact force *(jin bin)*, the integration of operational capabilities *(he cheng)*, and the development of highly efficient weapon systems *(gao xiao)*[8]. Establishing a compact force, which is different from mere force reduction, emphasizes the building of a highly mobile and highly effective rapid reaction force (RRF) to cope with limited, high-intensity, regional military operations, anti-terrorist operations, and anti-subversion operations. The decision to establish RRF was made in 1994 and has covered three services (Army, Navy, and Air Force) and "second artillery" (China's nuclear force). Currently, the PLA has designated seven army units, one airborne corps, and one marine corps as rapid reaction forces. There is no evidence to support whether "second artillery" has come up with RRF capability. RRFs are under Central Military Commission (CMC) control and conduct first strike missions under emergency conditions or act as a strategic reserve when dealing with subsequent operations[9]. Integration of operational capability means to practice combined operation under hi-tech conditions. It emphasizes linkage among the various branch RRF units, navy and air force strike forces, second artillery ballistic missile units, and other special operation units such as electronic and information warfare units. Battlefield and campaign operational management and system integration have become core operational issues as witnessed by various exercises conducted in the Taiwan Straits since March 1996.

In order to deter or deny future threats under hi-tech conditions, PLA leadership has also determined to develop "selective pockets of excellence" in certain high-tech weapon systems to protect its national interests. Such weapon system development is meant to ensure that China possesses the most effective means for exploiting critical vulnerabilities in adversarial defenses.

This approach could give China the credible deterrent needed to accomplish political and military goals without having to rely on overwhelming force superiority. Planners are seeking to identify innovative tactics for those systems and technologies that the PLA has used successfully or can be reasonably expected to use in the following decades. China has placed emphasis on the development and acquisition of strategic weapons and delivery platforms such as strategic and tactical nuclear ballistic missiles with MIRV warheads, as well as new types of SSBNs and SSNs.; It is also pursuing stand off weapon systems such as laser guided and precision weapon systems, antiship cruise missiles (ASCMs), long-range land attack cruise missiles (LACMs), short range ballistic missiles (SRBMs); and more advanced electronic warfare and information warfare systems.

China believes the development of pockets of excellence in advanced hi-tech weaponry can help China in developing an asymmetric doctrine that would allow it to effectively engage a more technologically advanced potential adversary.

RMA and Debates on Defensive vs. Offensive Strategies

There is no question that China is determined to modernize its armed forces and upgrade force projection capability beyond its continental land mass. Yet whether China is, or will be preeminent in all of Asia is still debated among PLA experts.

One school of experts does not believe China possesses military preeminence over Asia because, first, China is limited by geography. China's military superiority does have some significant impact over its contiguous neighbors, including a possibly unified Korea. The majority of East Asian rimland countries are, however, island and archipelago states; they therefore remain beyond the reach of China's formidable ground forces. Second, others simply discount China as unbalanced military power. The naval and air forces required to accomplish a projection mission are, in most cases, obsolete, small, or nonexistent[10]. The PLA's current force structure does not have the capabilities to control the sea and airspace in mid-distant offshore theaters, to lift large numbers of troops by sea or air, to conduct surveillance around the East Asian maritime area, nor to conduct sustained long-range air strikes (with the exception of its conventional ballistic missile force). Thirdly, even though China has increased its defense budget for the last 10 years and will likely continue to do so in the future, these efforts have born little fruit in terms of upgrading its military industrial capability to assimilate new technologies, accessing foreign technologies, increasing military professionalism, system integration, or even operating state of the art imported weapon systems and platforms. Backwardness of military industrial capability and emphasis on self-reliance in defense technology makes it difficult for China to produce significant numbers of high-quality weapon systems. Should China's defense industry reforms fail, the PLA could end up dependent on imported arms[11].

The other school of experts tends to look at the PLA modernization and military capability in different way. China may not seek to become the preeminent Asian power in the future. It probably has no ambition to exercise hegemony over its neighbors, yet it already possesses the military potential to intimidate a limited area on its periphery. The obvious scenarios are the Taiwan Straits and the South China Sea claimant disputes[12]. China has identified fighting and winning a hi-tech local war as its current and future military objective, it has decided to give military modernization priorities to the missile

program, air and naval arms, and building rapid-reaction ground forces. The PLA strategy also calls for building elite forces, which will be able to respond quickly to a regional hot spot and dominate the land, air, sea, space, and electromagnetic spheres of the battle space[13]. Such focused political objectives and calculated military operations do impact the East Asian military balance and security environment. Its potential challenge to U.S. military presence and possible intervention are also significant[14]. China's military threat is becoming more of a clear and present danger to East Asian's peace and stability.

Obviously the polarized debates will continue as observers follow China's continuous modernization program, particularly in areas of force projection, long-range strike capabilities, and pockets of excellence technology in improving deterrence and denial capabilities.

Weapon System Revolution: "Pockets of Excellence" Weapon Systems and Technologies

The Chinese leadership's decision to seek "pocket of excellence" or "assassin mace" *(xa xou jian)* weapon systems and technology is to deter or deny any stronger adversary in future war scenarios, with a particular emphasis on the Taiwan Straits conflict. Open sources indicate China is committed to developing advanced technologies in electronic warfare (EW), information warfare (IW), land attack cruise missile (LACM), military space and conventional theater missile development, and even directed energy weapons. Western experts see these developments as part of Beijing's intention to develop and implement "asymmetrical warfare" or pursue a revolution in military affairs.[15] These capabilities are designed to enable the PLA to conduct preemptive strikes, integrate and synchronize EW, IW, theater missile and air strikes, and conduct special operations in local warfare under hi-tech conditions. Realization of the current "pockets of excellence" development would help us to assess the PLA's challenge to future Asian security.

A. Electronic Warfare (EW) Capability

China's interest in developing EW capability is centered on improving its intercept, direction finding, and jamming capability. This concerted effort includes importing state-of-the-art technology from the west and Russia in recent years; improving extended imagery reconnaissance and surveillance and electronic intelligence (ELINT) collection, and developing unmanned aerial vehicle (UAV) as platforms for improved radio and radar jammers. Furthermore, China's existing earth stations can be modified to interfere with satellite communications. The PLA also is developing an electronic countermeasure (ECM) doctrine and has conducted training exercises in an ECM environment. With regard to developing offensive EW capability, the PLA does possess electro magnetic pulse (EMP) bombs which are designed to paralyze an enemy's electronic and information systems[16].

B. Information Warfare (IW) Capability

China has recognized information warfare (IW) technology as a key strategic weapon in future warfare scenarios. It also recognizes that China is facing an IW threat and is in need of developing IW defensive measures and counter measures as well as developing offensive IW capabilities. China is placing more of an emphasis on defensive, rather than offensive IW capability, and over the last few years the Communication Command Academy in Wuhan has become one of the major PLA IW research facilities. PLA's research on IW theories is said to be mature, and is currently developing its own IW doctrines[17]. Some reports have indicated that the PLA has set up a "net force" (*Wan Jun*) to operate IW, but there is no evidence to support this claim so far. Among the defensive IW capabilities China is thought to be developing are computer anti-virus solutions,

network security, and advanced data communication technologies. Such efforts would increase the PLA's expertise in defending its own network against enemy attack, and also is likely to enhance its offensive penetration capability in future.

C. LACM and ASCM

Open sources indicate China is showing a particular interest in producing indigenous land-attack cruise missiles (LACMs). The necessary technologies include airframe design, propulsion systems (such as small turbojet engines and ramjets/scramjets), and guidance technologies (such as GPS for in–flight navigation and terrain contour matching guidance, imaging infrared, or synthetic aperture radar for terminal homing)[18]. Reportedly, China has produced at least two types of LACMs, Hong Niao-1 and Hong Niao-2, with effective ranges of probably 400km-600km[19]. These Hong Niao LACMs are believed to have been designed and developed by acquiring foreign cruise missile technology and subsystems, particularly from Russia. LACMs could be deployed sometime in 2005. Meanwhile China is also improving and modifying LACM technologies for airborne and submersible launch platforms, which will greatly enhance the LACM's long range strike capability.

There currently are six types of antiship cruise missiles (ASCMs) in the PLA inventory. These ASCMs include the CSS-N-1, CSS-N-2 CSS-N-4/C801, SS-N-61 C802, C-701, and SS-N-22/ SUNBURN supersonic ASCM systems which are deployed on the two Sovremennyy-class guided missile destroyers (DDGs) purchased from Russia. The indigenously produced ASCMs can be deployed and launched by naval coastal defense missile units, bombers, surface warships, and submarines, providing China with considerable area denial and sea control capabilities[20].

D. Space and Theater Missile Development

China has been intensely pursuing military oriented space development projects in recent years. It is believed that China has the capability to produce, and eventually may deploy, advanced imagery reconnaissance and earth resource systems with military applications. The China-Brazil Earth Resources Satellite (CBERs) launched in October 1999 will support Beijing's efforts to develop improved military reconnaissance satellites[21]. In addition China has launched at least three low-orbit meteorological satellites *(zi yuan)*, two geosynchronous weather satellites *(fong yung),* and two experimental GPS satellites *(bei dou)* in last few years[22].

Through these satellite deployment experiences, China is enhancing its satellite technology level in the areas of reconnaissance, surveillance, and targeting capabilities. China's pursuit of manned space operations remains a high priority and such a move could contribute to improved space military systems in the next 20 years. China is also seeking to integrate GPS and the Russian Global Navigation Satellite system (GLONASS) guidance technology into fighters, helicopters, and LACMs. China could be expected to launch more improved GPS satellites in next few years, as it sees this as valuable navigation aids to complement improved long-range strike capabilities.

All types of ballistic missiles in the PLA second artillery are capable of carrying conventional and nuclear warheads. China views its growing conventionally-armed Short Range Ballistic Missile (SRBM) force as a potent military and diplomatic factor in dealing with the Taiwan Straits equation, even though doubts remain as to whether or not missile intimidation advances Beijing's objectives.

China currently possesses two types of conventional ballistic missile, the CSS-6 (M-9) and the CSS-7 (M-11), solid propellant, road mobile SRBMs. The PLA currently has at

least one regimental-sized M-9 SRBM unit deployed in Fujian province. It is estimated that 250-300 M-9 SRBMs are stationed opposite the Taiwan Straits[23]. Improved, longer range variants are available and operational, and SRBM accuracy has been improved since the 1996 exercises with satellite-assisted navigation technologies. In an armed conflict with Taiwan, China's SRBMs and LACMs would likely be preemptive strike weapons which could target air defense installations, airfields, naval bases, C^4I nodes, and logistics depots.

In addition to the development of offensive missile capabilities, Beijing reportedly is developing state of the art antimissile systems to defend against cruise missiles and Theater Ballistic Missiles (TBMs).

To date, limited numbers of the SA-106, the SA-10c, and SA-15 SAMs have been acquired from Russia to fill gaps in China's air defense structure. China has also modified its Hong Qi-7 (HQ-7) series of SAMs with an improved capability to counter cruise missiles. The HQ-9 SAM, currently under development, is believed to be modeled after the US Patriot, and reportedly is intended to provide long-range defense against fixed-wing aircraft, as well as against TBMs. Though China and Russia may be involved in developing an ABM system for China, a Chinese ABM capability is not anticipated for the next 10-20 years[24].

E. Directed Energy Weapons

China is believed to have a highly developed electro-optic industry, as well as the ability to develop laser weapons, including tactical laser weapons. The Chinese produced ZM-87 neodymium laser blinder is intended for use primarily against ground targets, and it could be used against aircraft with improved range and anti sensor capabilities.; China is also reportedly investigating the feasibility of ship borne laser weapons for air defense[25] Future laser research will likely emphasize improved target acquisition and pointing and tracking capabilities.

Revolution in Force Structure: Rapid Reaction Forces

Rapid Reaction Forces: Ground Force

Current evidence has shown that the PLA has designated seven Group Armies (GA), the 15th airborne corp, and two Marine brigades as RRFs or "Fist Army". Of the seven RRF group armies, two are stationed in Beijing MR (27th GA, 38th GA), one in Shenyang MR (39th GA), one in Jinan MR (54th GA), one in Nanjing MR (1st GA), one in Lanzhou MR (21st GA), and one in Chengdu MR (13th GA). The total number of personnel assigned to the RRFGA is thought to range from 75,000-89,000. This force structure includes tank and mechanized divisions, a motorized division, an infantry division, an artillery division (brigade), a ballistic missile brigade, anti-aircraft artillery (AAA) and air defense brigades, an engineering brigade, a helicopter team (unit), a chemical warfare regiment, a communication regiment, and an electronic warfare unit[26]. The RRFGAs, however, contain various combinations of these forces, partly due to mission objectives, and partly due to different paces and time tables of group army transformation to RRF. For example, 38th GA of Beijing MR and 39th GA of Shenyang MR contain more armored and mechanized divisions than other GAs, indicating their main task is probably homeland defense in northern China. The 38th GA even contains the latest FM-80 SAM missile brigade and Z-9 helicopter gun ship team *(da dui)* which are probably intended to reinforce the defense of Beijing. The 54th GA of Jinan MR is designated the strategic reserve GA and may be rapidly deployed to assist other MR in the case of an emergency contingency. One armored infantry division is stationed near the Beijing Guanzhou and Longhai railway lines, and close to the base of 15th airborne corp. This unit can be

speedily deployed to any other part of China, including the coastal area near the Taiwan Straits. The 54th GA also contains a GA level helicopter team, an electronic warfare team, a special forces unit, an artillery brigade, and an anti-aircraft missile artillery brigade. The 54th GA is directly controlled by the CMC, and can be mobilized within 6 hours, and deployed to Beijing or a coastal region near the Taiwan Straits within 15 hours[27]. The 27th GA of Beijing MR is also designated a strategic reserve GA, but it contains less armored and mechanized divisions with no helicopter team. As a strategic reserve GA, some units were ordered by the CMC to participate in the 1996 Taiwan Straits exercises. Those 7 RRFGAs, according to PLA classification, belong to the "A" category *(jia lei)* GA, other GAs such as the 42nd GA of Guanzhou MR, the 12th GA of Nanjing MR are close to category A GAs. In the case of a Taiwan Straits confrontation, the 1st GA of Nanjing MR (covering Northern flank of the coastal region), the 42nd GA of Guanzhou MR (covering southern flank of the coastal region) along with the 15th airborne corp may be deployed as the main attacking force, following missile strikes and air strikes.; The strategic reserve of the 27th GA and the 54th GA could be ordered to assist frontline operations if necessary. Close to category A, the 12th GA is the main backup to conduct second wave of attack.

Though RRFGAs are becoming the core elite units of the PLA ground force, their main assignment is still home defense simply because they are heavily dependent on road and rail transportation for their deployment. The PLA lacks adequate air-lift and sealift capability to deploy the heavily armed RRGA beyond the Chinese boarder region. In the event of a confrontation with a capable adversary offshore, most likely only the technical and special force units could be rapidly deployed to the scene by helicopters and other airlift. This has been demonstrated in exercises. Thus, in terms of ground force RRF, its main task remains homeland defense, rather than force projection beyond China's boundary. This will remain the case for the next decade or two.

RRF: Airborne Corps

The 15th airborne corps is one of RRFs of the PLAAF. It contains 3 airborne divisions with 30,000-40,000 troops. Each airborne division contains two to three regiments and one divisional headquarter. The 43rd airborne division is designated as a rapid deployment division, and is stationed in Beijing MR. It contains one infantry airborne regiment, one armored/motorized infantry regiment, and one artillery regiment. The 44th division is designated as an airborne reserve force and is stationed in Nanjing MR. The 45th division is also designated to be rapidly deployed; it contains three infantry regiments and one division headquarter. The 45th division is rectified by the CMC as the only RRF within Guanzhou MR[28]. Currently, PLAAF has 30 Yu-8 and 20 IL-76 transport aircraft, which have long-range capability for airborne dropping. With this airlifting capacity, the PLA can only deliver two airborne regiments (including one motorized or artillery regiment) to a drop zone at one time. This is a very limited striking force if not supported by additional elements.

RRF: Marine Corps

Currently China has two marine brigades attached to the PLA Navy South Sea Fleet. Its total manpower is about 40,000 personnel. It has one amphibious tank regiment with Type 63 amphibious tanks and Type 77 APCs. Marine brigades are designated as the Navy's RRF. Again, due to limited amphibious landing capability, the PLA Navy can only deliver a maximum of 5,000 marines and a limited number of amphibious tanks and APCs in any off shore landing operation[29].

Enhancing Conventional Strike Capability: Air strike and Sea Control

In addition to airborne corps, the PLAAF has eight regiments, one battalion, and five airbases being designated as units of RRF. These contain 532 various types of fighters, bombers, and transport aircraft. The strategy and tactics of the PLAAF to fight a future war under hi-tech condition has been described as "conducting active defense with offensive initiative to impose air blockades, launch air strikes, as well as conduct joint operations with the ground and naval forces"[30]. Some PLAAF leaders believe that in order to allow air force to react appropriately to any situation, including gaining air superiority and conducting counterattacks against targets inside the enemy's boarders, the PLAAF should rapidly replace its aging fleet with state of the art fighters, , bombers, reconnaissance aircraft, and special purpose planes. Current aircraft that are designated as PLAAF RRF are not perceived to be mission capable for establishing air superiority, supporting ground force operations, and even conducting long range counterattacks. Yet the PLAAF is far from lagging behind other services in the area of modernization. In recent years, the PLAAF has received new fighters, bombers, air to air, and air to surface missiles, and is currently developing indigenously designed fighters. Funding for PLAAF overhaul programs has been budgeted, and air strike capability could be greatly enhanced by the year 2010[31].

The navy's RRF, aside from the marine corps, is to exercise sea control and sea denial missions within Chinese territorial waters, EZZs, and peripheral waters in the Western Pacific Ocean. In terms of the PLA navy's current force structure, China is less likely to build an ocean-going blue water navy than building and deploying sufficient adequate surface combatants, submersible vessels, replenishment and support ships to exercise limited offshore active defenses. These missions include executing limited operations in defense of territorial claimants such as those in the South China Sea, supporting sea denial and anti-access strategy in a Taiwan crisis scenario, or to exercise sea control (as demonstrated by strong coastal missile build up near Bohai Bay and along Shangdong and Liaodong Peninsulas). To fulfill these strategic objectives, the PLA is enhancing its modern heavy-displacement DDGs, missile frigates, diesel submarines, nuclear-powered attack submarines, and naval aviation.

RMA: Schools of Thought

As early as the mid 1980s, planners within the PLA began to set parameters for force modernization. This effort was designed to fulfill the new military strategic objectives of fighting and wining a local warfare under hi-tech conditions, and upgrading the quality of the PLA to the level of the advanced countries. Two lines of thinking prevailed in modernization deliberation: the first argued that the priority should be given to the development and improvement of hi-tech elements with strategic importance (such as space industry, laser and particle weapons, automation, biotechnology, information systems, energy industry, and material sciences). This school is led by top civilian/military scientists in the country and was considered in conjunction with the advanced science development of PRC in the 21st century. The second school of thought was more focused on military interests and military implication, and argued that the priority should be given to the development of hard-kill and soft-kill capabilities of information warfare. This school of thought was led by top military planners and theorists in CMC and National Defense University. They considered the information technology to be the key to upgrade PLA's C^4ISR capability in future warfare, which in turn is key to battlefield success. The PRC leadership does not consider these two lines of RMA thought to contradict one another. With better coordination and integration, these two approaches can, in fact, complement each other rather than conflict. The development of strategic hi-tech elements was approved by Beijing in the name of "Project 863" in March 1986. This project was meant to improve and upgrade China's advanced hi-tech

infrastructure and consolidate the existing state-owned military-industrial research and development laboratories. The development of information warfare capabilities was also approved by the leadership as "Project 95" in 1995. Emphasis was given to developing soft-kill IW capability with enhancement of C^4ISR, as well as the ability to conduct electronic/magnetic warfare, psychological warfare, Cyber war, and Hacker war. Hard–kill IW capability is focused on the development of "pockets of excellence" weapon systems such as laser/particle beam weapon systems, anti-satellite weapon systems, land-attack cruise missiles (LACMs), anti-radiation missiles, and laser-guided smart bombs.

Obstacles in Developing RMA

It is believed that China does possess the ability to assimilate modern RMA concepts and theories, and is beginning to develop its own RMA war fighting capabilities based on advanced information technology. Yet China is still suffering from three major obstacles in implementing RMA in its modernization processes. First, the military still lacks adequate and sufficient funding for advanced hi-tech development. China's defense spending has consistently increased in double digit percentages in the last ten years, but those increases were mainly used for force reduction, welfare and salary improvements, organizational restructuring and streamlining, and foreign procurement RMA R&D received little funding and the PLA is constantly demanding more defense budget increases. For example, enhancement of C^4ISR capability for the ground forces can only be implemented in a handful of elite units of the CMC designated Rapid Reaction Forces (RRF) within First-class Group Army (GA). It could take decades for the PLA to fully implement C^4ISR.

Second, the backwardness of the military industrial infrastructure prevents China from developing state of the art weapon systems and platforms indigenously. In the last ten years or so, China has spent tens of billions of dollars on importing foreign weapon systems and technologies. These are hardly taking root in China and, instead are making the PLA dependent on old systems rather than integrating hi-tech weapons. For example, China has signed contracts with Russia to produce the SU-27SK and Su-30MMK fighter aircrafts in China and yet was not successful in indigenous production. The FC-1 fighter aircraft (co-developed with Israel) also suffered the same fate. It is reported that a LACM project could not overcome its critical technological glitch for the lack of crucial advanced terrain-following computer mapping technology.

Third, China is still lacking well-trained engineers and scientists in its military-industrial complex. Lack of incentives and prospects of promotion in the state sector discourage well-trained, foreign educated young talents to join state-initiated RMA projects. In fact, the military is less dependent on the state sector than on the private industries to upgrade its C^4ISR capabilities. It is worth noting that the rising private IT industries in China could be a major contributor to the enhancement of PLA IW capabilities in the future.

Whither the RMA?

China's determination to proceed with some aspects of RMA is evident in its pursuing development of advanced technology and weapon systems. Beijing's capability to produce an array of ballistic missiles, LACMs, and ASCMs has not only given its military the ability to conduct long range strikes , but also poses a great threat to Taiwan and neighboring territories. Beijing may not be able to acquire power projection capabilities to the larger Western Pacific region in the next decade or two, owing to difficulties in assimilation or integration of modern technologies in producing state of the art naval surface combatants, submersibles, and fighter aircraft[33], but its intention to pursue specific technological and weapon system revolutions to go hand in hand with its "active

defense" and "near sea defense" strategies does raise great concern. Beijing's improvements in developing advanced information technologies and the ability to integrate these technologies in information warfare (as demonstrated in a series of exercises) is a particular concern among China military watchers.[34] Furthermore, starting from the late 1990s, the PLA has embarked on a two-phase modernization plan. First, the PLA is scaling down to a smaller, higher quality force by exploring overall RMA concepts in multiplying strength through jointness and increased coordination among the various services. The other is to continue focusing on pockets of excellence research and applications in order to facilitate the conduct of information war and long distance precision strike operations[35]. These RMA-like modernization plans will boost China's confidence in fighting and winning a local war under high-tech conditions.

Notes

1. Research on RMA related issues were carried out in the beginning of 1987 when the Academic of Military Science (AMS), the top think tank of the Central Military Commission (CMC), was instructed to conduct systematic analyses of China's defense in the year 2000, and making policy recommendations to military leaders. The policy recommendation made adoption and integration of information technology into weapon system development a priority in China's defense construction in 2000. See *Future Defense Construction* (*weo lai de guo fang jian she*), edited by the Department of Planning Organization, the Academic of Military Science, Published by Military Science Press, Beijing, 1990, P.p. 175-180.
2. Liu, Hong-ji, "Comments on New Military Revolution with Chinese Characters", *National Defense University Journal*, Vol. 104, February, 1998, National Defense University Press, Beijing, P.p. 67-69.
3. Gao, Chung-xiang, ed., *Theory on New Military Revolution*, Military Science Press, Beijing, 1996, P.p. 19-33.
4. Ibid, P.p. 220-221.
5. The PLA's discussions over how to fight a local war under hi-tech conditions have been published by journals of National Defense University and Academy of Military Science. These discussions also paid reference to future Taiwan Straits confrontations. For detailed reference, See Michael Pillsbury, *China Debates the Future Security Environment*, National University Press, Washington D.C. 2000, Chapter 6, P.p. 259-297; also see Chong-Pin Lin, "PLA's Development of 21st Century Strategic War Power". In Milton Liao ed., *Thesis Collections on China Military Study*, published by Institute of Chinese Communist Study, April, 2000, P.p. 291-326; Jer-ming Zhang & Wen-Chung Zhai, "Chinese Development of Asymmetrical Warfare and Its Impact on ROC's Security" in *Journal of Strategic and International Studies*, Vol. 1, No. 3, July, 1999, P.p. 163-165
6. Arthur Shu-Fan, Ding, *China's Military thoughts: 1978-1991*, Tan Xan Publishing Co., Taipei, Taiwan, ROC, 1996, P.p. 46-51.
7. Based on regular contact between this author and senior PLA officers attached to DU and AMS, and spending considerable time at these two institutions since 1995, it is this author's understanding that there is no other institution either official or unofficial in China which outweighs these two institutions in providing military policy recommendations to Central Military Commission decision-making. AMS, in particular, plays the role of the only institution for senior staff officer training, strategy, tactics, and doctrine for PLA operation for more than 30 years. AMS' role of training senior officers was only transferred to NDU when it was established as China's highest military education institution in 1985. The division of labor between AMS and NDU, in principle, is to have AMS concentrating on the development of new strategies, tactics and doctrines, and NDU organizing courses, seminars, and special classes for the training of various levels of senior officers. Starting from 1992, NDU also offered graduate courses for masters and doctoral degrees. Degreed officer students, and senior researchers at AMS can be instructors, if qualified, for master-degree or Ph.D. degree candidates. In addition to teaching, NDU professors and instructors are involved in research on foreign advanced military theories, concepts, and doctrines. There is frequent interaction and exchange between NDU and AMS researchers in assessing and debating current external military affairs. Implementation of new doctrines and tactics is heavily debated by the senior officers enrolled in NDU courses and training programs. These debates and recommendations are also submitted to the CMC for deliberation. After several interviews, this author also realizes that AMS researchers are asked to assess doctrines and tactics being implemented during various exercises in the Taiwan Straits, South China Sea, and East Sea. They are also asked to make recommendations to improve doctrines and tactics currently

being adopted in combined operational exercises. Lessons provided by AMS researchers are also adopted for further reforms in the PLA force structure, training, and other modernization programs. It is fair to say that the NDU and AMS are the nerve centers in assisting PLA decision making.

8. These three primary defense modernization guidelines was approved by PRC's 9th Five Year Plan (1996-2000), and are also included in the general political report at the 15th Party Congress, September, 1997. See *Yearbook of Chinese Communist Studies 1998*, Chapter 8, published by Institute of Chinese Communist Studies, July, 1998. P.p. 8-4.
9. Andrew N.D. Yang & Milton Wen-Chung Liao," PLA Rapid Reaction Forces: Concept, Training, and Preliminary Assessment", in James C. Mulvenon & Richard H. Yang eds., *The People's Liberation Army in the Information Age*, Published in 1999 by RAND, P.p. 49
10. Kenneth Allen, "PLA Air Force Logistics and Maintenance: What Has Changed?", and Dennis Blasko, "A New PLA Force Structure", in James C. Mulvenon & Richard H. Yang eds. *The People's Liberations Army in the Information Age*, Published in 1999 by RAND, P.p. 97-98, P.p. 287-288.
11. Ibid, P.p. 73-75.
12. Ji-Chung Shi, *China Develops Attacking Taiwan and Denying U.S. Intervention Strategy: Theory and Practices*, Monograph No. 23, Institute of Strategic and International Studies, Taipei, Taiwan, POC, P.p. 27-36.
13. Ibid, P.p. 40-42
14. Edward Timperlake & William C. Triplett II, *Red Dragon Rising*, Regency Publishing, Inc. Washington D.C., 1999, P.p. 121-136, P.p. 166-167.
15. The PLA's interest in studying the Revolutionary in Military Affairs (RMA) was largely driven by its quest for hi-tech weapon systems and application of these weapons in the Gulf War (1990-91). According to Michael Pillsbury, PLA has been devoted to study of US and Russian RMA concepts and doctrines since the mid-1990s, and NDU/AMS researchers have published over 50 articles which explore RMA concepts for the Chinese military context. Some PLA experts argue that the PLA's interest in studying RMA is nothing more than to improve its level of technology, which is very different from the western concept. However Pillsbury has managed to sum up the PLA's vision of RMA which includes:
    a. to enable the PLA to eliminate the information gap;
    b. to establish a net system to integrate all branches of armed forces;
    c. to be capable of attacking and paralyzing an enemy's C^4I;
    d. to ensure the ability to attack first;
    e. to employ directed weapon systems;
    f. to develop computer viruses;
    g. to adopt submarine-launched weapon systems;
    h. to adopt anti-satellite weapon systems;
    i. to intercept enemy's expanding logistics support;
    j. to deploy special forces in attacks.

    See Michael Pillsbury, "China and Revolutionary Military Affairs", prepared for the Office for Net Assessment, Pentagon, U.S.A., 1997, p. 6.
16. Again, many western PLA experts believe China possesses very limited EW capability either in terms of ECM or in terms of intelligence collection, or even conducting electronic warfare against advanced ECM adversaries. This is shown by China's aggressive search for advanced EW systems from abroad, such as Israel and Russia, as well as China's collaboration with Russia to produce improved ECM-capable fighter radar and ECM pods. One can only identify China giving priority to EW upgrade. There is little evidence supporting the claim that China's EW capability has been greatly upgraded in recent years. See Bernard D. Cole & Paul H.B. Godwin, "Advanced Military Technology and the PLA: Priorities and Capabilities for the 21st Century", in Larry M. Wortzel ed., *The Chinese Armed Forces in the 21st Century*, published by U.S. Army War College, December 1999, P.p. 169-205.
17. Chinese IW capability is comprised of three approaches: information acquisition, information protection, and information attack. It is estimated that China's intelligence gathering networks are highly successful. China has devoted resources to improve its signal intelligence (SIGENT) capability by building advanced communication satellites and developing mini satellites. Both protective and offensive IW measures have been heavily emphasized in recent years. The goal has been to implement the PLA IW doctrine of striking strategic targets to disrupt an enemy's ability to wage war. The State Science and Technology Commission (COSTIND) oversees the development of IW capability, and collaborates closely with the

Central Space Committee (CSC) and the China Aerospace Cooperation (CAC) in policy decision making as well as system integration. See Mark A. Stokes, *China's Strategic Modernization: Implication for the United States*, published by Strategic Study Institute, US Army War College, September 1999, Ch. 3, P.p. 25-59.

18. Richard A. Bitzinger, "Going Places or Running in Places? China's Efforts to Leverage Advanced Technologies for Military Use", in Susan M. Puska ed. *People's Liberation Army After Next*, Strategic Study Institute, US Army War College, August 2000, P.p. 11-13.
19. Richard Fisher, "Foreign Arms Acquisition and PLA Modernization: Appendix, "in James R. Lilly and David Shambaugh eds., *China's Military Faces the Future*, Armork, NY: M.E. Sharpe, 1999, p. 131, also *Flight International* (a weekly aviation magazine) published a photo showing HN-1/2 LACM being test fired in China. See *Flight International*, April 28th, 2000, p. 18.
20. Bitzinger, "Going places or Running in Places? China's Efforts to Leverage Advanced Technologies for Military Use", P.p. 18-19
21. China's efforts to develop improved military reconnaissance satellites is increasingly a major concern of US defense analysts. It is estimated that by the 2005-2010 time frame, China's space-based surveillance systems could have at least four components: 1) synthetic aperture radar (SAR) satellites for all weather, day/night monitoring of military activities; 2) electronic reconnaissance satellites to detect electronic emissions in the Western Pacific; 3) mid-high resolution electro-optical satellites for early warning, targeting, and mission planning; and 4) a new generation of high resolution recoverable satellites for intelligence and analysis. See Mark A. Stokes, "China's Military Space and Conventional Theater Missile Development: Implications for Security in the Taiwan Strait," in Susan M. Puska, ed., *People's Liberation Army After Next*, Strategic Studies Institute, US Army War College, August 2000, P.p. 112-113.
22. The ROC armed forces intelligence estimation of China's Space programs speculates that China will conduct a series of military satellite launches between 2002 and 2005. Priority will be given to electro-optical satellites for early warning and targeting. See *United Daily*, February 24, 2000, p.1.
23. The number of M-9 (DF-15) SRBMs deployed in coastal region in Fujian province is always debatable. Western analysts tend to have more a conservative estimation, while the ROC intelligence community tends to come up with more. Intelligence estimation of M-9 SRBM launchers possessed by the Second Artillery brigade off the Taiwan Straits is between 18 and 20. This indicates that the maximum number of SRBMs potentially firing on Taiwan is no more than 20 at one time.
24. It is understood by this author that China is not currently seeking to develop an ABM system, nor does China show great anxiety over US NMD programs. It is not China's interest to compete with the US in advanced missile and space programs. China's priority is to possess limited pockets of excellence weapon systems, which would allow China to become a recognized regional power. Also see Mei Lin, "Mission and Primary Battle Technique of Conventional Guided Missile Units of Second Artillery", *Studies on Chinese Communist Monthly*, Vol. 35, No. 4, April, 2001, P.p. 86-98.
25. Though China does have high-power laser R&D programs, it is difficult to say whether China will deploy space-stationed laser weapon systems in the distant future. See Stokes, "China's Strategic Modernization: Implications for the United States", September 1999, P.p. 119.
26. Sources from http://www.cqch.com.cn/zgjs/lj.htm
27. This is the estimation and speculation made by the same website as above; in reality, there is no evidence to support such assessment.
28. There were reports that airborne divisions have been restructured to airborne brigades to enhance mobility, yet there is no evidence supporting this change. See Milton Wen-chung Liao, "PLAAF Strategy and Weapon Modernizations", in Milton W.C. Liao ed. *Thesis Collections in China Military Studies*, published by Institute of Chinese Communist Studies, April, 2001, P.p. 374-378.
29. Wen-Chung Zhai, *Taiwan's Survival and Maritime Power Development*, Mai Tien Publishing Co, Taipei, Taiwan, ROC, July 1999, P.p. 167-177
30. Kenneth Allen, "PLA Air force Organization", paper delivered at the CAPS/RAND PLA conference, June 22-24, 2000, P.p. 7-8
31. Milton W.C. Liao, "Theory and Practice of PLAAF Offensive/Defensive Strategy", in *Studies on Chinese Communist Monthly* vol. 35, No. 5, May, 2001, P.p. 75-77. Again, Milton Liao has made some very interesting remarks in this recent article which follows his previous article on the same subject. He argued that during late 2000, when the PLAAF was asked by the CMC to design plans and budget for PLAAF 10th Five Year Plan construction, the organization requested RMB 120 billion (equivalent to 15 billion USD at

current exchange rate) from 2001-2005 to replace aging fighters with advanced jet fighters (such as Su-27, Su-30, and J-10). The number of the first line jet fighters requested by the PLAAF was as high as 1,200 by 2005. Were this estimation to be realized, the PLAAF's strike capability could be enhanced greatly.

32. Two important trends in the PLA Navy's improved strike capability are missilization of its surface combatants/submarines, and increased numbers of new air defense/strike aircrafts. The PLA Navy has received three indigenously built diesel submarines, including the Song class (Type 039), which is believed to be capable of launching ASCM (probably C-801/802). It is believed that the Type 039 subs are to replace old Ming-class and Romeo Class submarines before 2010, and become the PLA Navy's backbone task force in sea control and sea denial. Naval aviation has been receiving new fighter jets such as the J-8II, Su-27, Su-30, and FB-7, greatly enhancing its anti-ship capability. See *Yearbork on Chinese Communist Studies 2000*, published by Institute of Chinese Communist Studies, Taipei, June, 2000, P.p. 5-116.
33. Paul Dibb, "The Revolution in Military Affairs and Asian Security", *Survival*, Vol. 39, No. 4, Winter 1997-98, p.110.
34. Lin, Chin-jing, "Military Purposes of PRC's Information Warfare", *Studies on Chinese Communism Monthly*, Vol. 34, No. 11, November, 2000, P.p. 111-112.
35. In August 1998, the Chinese Communist Party Politburo approved a national security construction project called "998 National Security System Engineering", in which the PLA was asked to speed up the development of laser/particle beam weapon systems as the priority in China's effort to deter U.S. National Missile Defense (NMD) programs. See http://cokin.myrice.com/yaowen/yaowen 200059.htm